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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,751	04/13/2006	Arrigo Arletti	FE 6138 (US)	3905

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EXAMINER	
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ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,751	ARLETTI ET AL.	
	Examiner	**Art Unit**	
	Andrew Janca	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _28 August 2009_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-25_ is/are pending in the application.

4a) Of the above claim(s) _15-23_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-14,24 and 25_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. This application contains claims drawn to an invention nonelected with traverse in the reply filed on 2/26/09. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

2. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Response to Arguments

3. Applicant's arguments filed 8/28/09 have been fully considered but they are not persuasive.

4. The amendments to claim 1 have overcome the 103 rejections over Ferraris in combination with other references (Remarks parts D, E, H, and I) and so these arguments are moot. However, the amendments do not overcome the remaining 103 rejections (Remarks part B, C, F, G) and so these will be addressed in turn.

5. Regarding the rejections over Arletti in view of Hetherington and Povey (Remarks p 6), agitators 4 and 16 in the vessels 1 and 15 of Arletti respectively are rotors. In both

vessels, since the portions of conduit 14 projecting into them have a real physical extent and cross-section, they necessarily act as static baffles to further modify and disrupt the flow, and hence are stators: only if they had no penetration into the vessels at all would they not have a baffle effect. Vessel 15 further possesses the interior draft tube 20 which also acts to channel and influence the flow induced by rotor 16 (paras 0045-0047), and hence acts as a stator; and Arletti further teach that vessel 1 may instead of the example depicted in figure 1 be a generic rotor-stator device (para 0035). Hence Arletti teach that both vessels 1 and 15 are rotor-stator devices.

6. Arletti further teaches that duct 14 has an axial inlet in the second rotor-stator device 15, for the inlet into the second device (the outlet of duct 14) opens into the axial region of device 15: since it is axially rather than peripherally located, it is an axial inlet (figures 1-2). This accords with the explicit definition given in the instant specification,

> Throughout the present specification, the term "peripheral outlet" means that the outlet is placed in proximity of the outer circumference of the rotor, the term "axial inlet" means that the inlet is placed in the central portion of the stator-rotor device, that is to say in proximity of the rotor axis. (p 4 line 21)

7. Arletti indeed does not teach that the initial portion of duct 14 may be oriented in a direction substantially tangential to the circumference of the rotor (Remarks pp 6-7). However, Povey teaches an annular outlet duct of which the initial portion is oriented in a direction substantially tangential to the circumference of the rotor (1:105-2:28).

8. Regarding the analogous nature of Arletti and Povey (Remarks p 7, both parts B and C), both Arletti (Abstract) and Povey (title, for instance) teach devices directed towards emulsification. Further, although as applicants point out one application of Povey’s apparatus is disintegrating solid materials (2:103-110), Povey explicitly states in

the same cited location (2:103-110) and in the location cited in the prior action (1:11-14) that the apparatus is also designed to be used for "the emulsification or admixture of liquids" (1:11-14).

9. Applicants' further arguments regarding the rejections of claim 6 over the above discussed references (Remarks parts F and G) repeat the arguments treated above. It does not appear that König explicitly teaches that the initial portion of a connecting duct should be substantially tangential to the outputting rotor.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Arletti, Hetherington, Povey

12. Claims 1-5, 7-14, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0096699 A1 by Arletti et al in view of US 2,461,276 to Hetherington and US 1,489,786 to Povey et al.

13. With regard to claim 1, Arletti et al teach a multistage process for the continuous production of an emulsion, the process comprising subjecting at least two immiscible liquids (para 26) to a sequence of at least two mixing stages carried out in at least two successive stator-rotor devices 1, 15 (figure 1) each comprising at least one rotor blade 4 and 16 and at least one stator, at least one of (14, 20, the unnumbered stator of the alternative embodiment of para 0035), the at least one rotor blade having a peripheral velocity, wherein a peripheral outlet 14 from a first stator-rotor device is connected to an axial inlet 14 (axial since within the central portion of the stator-rotor device 15, its axial draft tube 20, in proximity to its rotor axis [figure 1]) in a successive stator-rotor device 15 by means of a duct 14 comprising an initial portion and an end portion in which a Reynolds number Re_T inside said duct is higher than 5000 (para 24). Arletti et al teach that the mixing devices may be rotor-stator devices (para 35), but do not explicitly teach that they may be disks, nor that the peripheral velocity of each rotor of said stator-rotor devices may range from 5 to 60 m/s; nor that the initial portion of the duct should be oriented in a direction substantially tangential to the circumference of the rotor.

a. However, Hetherington teaches a multistage process for the continuous production of an emulsion (1:9-13), the process comprising subjecting at least two immiscible liquids (1:9-13, 5:56-63) to a sequence of at least two mixing

stages carried out in at least two successive stator-rotor devices each comprising at least one rotor disk 51, 52 and at least one stator 57, 58 (figure II; 4:37-63), the at least one rotor disk having a peripheral velocity, wherein a peripheral outlet 64 from a first stator-rotor device 51 is connected to an axial inlet 65 in a successive stator-rotor device 52 by means of a duct comprising an initial portion and an end portion (figure II).

b. Further, Povey et al teach a multistage process for the continuous production of an emulsion (1:11-14), the process comprising subjecting at least two immiscible liquids (else they would form a solution rather than an emulsion) to a sequence of at least two mixing stages (2:90-95) carried out in one stator-rotor device (2:65-75) comprising at least one rotor disk 3 (figure 1) and at least one stator (2:69-70), the at least one rotor disk having a peripheral velocity, wherein a peripheral outlet 21-22-44 (2:1-28) from the stator-rotor device is connected to an axial inlet 37 (2:11-14) in the same stator-rotor device by means of a duct comprising an initial portion where the fluids exit the rotor-stator arrangement and an end portion, the initial portion of the duct being oriented in a direction substantially tangential to the circumference of the rotor (1:105-2:28), and the peripheral velocity of each rotor of said stator-rotor devices ranges from 5 to 60 m/s (26 m/s: 2:32-33).

c. Arletti et al, Hetherington, and Povey are analogous arts, being from the same field of endeavor, emulsifying immiscible liquids. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to make

the rotors of Arletti et al disks, as does Hetherington: the motivation would have been to enhance dispersion by shearing action between the disks and static parts, and maximize the pumping action from one rotor-stator device to another (Hetherington 2:47-52, 4:75-5:3); and to rotate the disks at a peripheral velocity of 5-60 m/s, as does Povey: the motivation would have been to choose a rotational speed appropriate to the materials being treated (Povey 2:76-82); and to give the initial portion of the duct an orientation substantially tangential to the circumference of the rotor, as does Povey: the motivation would have been to convey the fluid from the rotor-stator arrangement into the duct by the centrifugal force of the rotor (1:105-2:28). Alternatively, it would have been obvious to one of ordinary skill in the art to rotate the disks of Arletti et al and Hetherington at peripheral velocities of 5-60 m/s, for routine experimentation to determine the optimal speed for a particular set of materials is within the ability of one of ordinary skill in the art (Povey 2:76-82). Alternatively, Povey et al teach that disks are an appropriate type of rotor for a rotor-stator arrangement such as that of Arletti et al, and further teach that the rotational speed is a variable desirable of optimization (Povey 2:76-82): and it would have been obvious to one of ordinary skill in the art to have optimized this result-effective variable.

14. The additional elements of claim 2, wherein said emulsion comprises, as a dispersed phase, a molten adduct of magnesium dihalide-Lewis base, are taught by Arletti et al (paras 17 and 22).

15. The additional elements of claim 3, wherein said emulsion comprises, as a continuous phase, a liquid which is inert and immiscible with said molten adduct of magnesium dihalide-Lewis base, are taught by Arletti et al (paras 17 and 26).

16. The additional elements of claim 4, wherein said inert and immiscible liquid is selected from aliphatic and aromatic hydrocarbons, silicone oils, liquid polymers or mixtures of said compounds, are taught by Arletti et al (para 26).

17. The additional elements of claim 5, wherein said molten adduct of magnesium dihalide-Lewis base may be fed to said first stator-rotor device at a weight ratio of less than 0.5 with respect to said inert and immiscible liquid, are taught by Arletti et al (para 50).

18. The additional elements of claim 7, wherein the peripheral velocity of the at least one rotor disk is comprised in the range from 20 to 60 m/sec, are taught by Povey (2:32-33).

19. The additional elements of claim 8, wherein the Reynolds number Re_T inside said duct may be higher than 8000, are taught by Arletti et al (para 40).

20. The additional elements of claim 9, comprising a sequence of three mixing stages, are taught by Hetherington (figure II); and also by Povey (2:93).

21. The additional elements of claim 10, wherein said magnesium dihalide is magnesium chloride, are taught by Arletti et al (para 28).

22. The additional elements of claim 11, wherein said Lewis base is selected from amines, alcohols, esters, phenols, ethers, polyethers, aromatic or aliphatic (poly)carboxylic acids, are taught by Arletti et al (para 27).

23. The additional elements of claim 12, wherein said Lewis base is an alcohol of formula ROH, in which R is an alkyl group containing from 1 to 10 carbon atoms, are taught by Arletti et al (para 27).

24. The additional elements of claim 13, wherein the molten adduct is $MgCl_2.mROH.nH_2O$, wherein m=0.1-6.0, n=0-0.7 and R=alkyl group C_1-C_{10}, are taught by Arletti et al (paras 27, 29).

25. The additional elements of claim 14, wherein m=2.0-4.0, n=0-0.4 and R=ethyl group, are taught by Arletti et al (para 29).

26. The additional elements of claim 24, where the end portion 65 of the duct is oriented in a direction substantially parallel to the rotation axes of each rotor, is taught by Hetherington (figure II; 4:36-58); and is further obvious over Povey, who teach that the inlets 37-38 to the rotor should be axial (figure 1; 2:11-14).

27. The additional elements of claim 25, where rotation of the rotor forces the emulsion to flow from the rotor axis towards the peripheral rim of the rotor, are taught by Povey (2:15-23); and also by Hetherington (4:47-54).

Povey and Arletti

28. Claims 1-5, 7-14, and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 1,489,786 to Povey in view of US 2003/0096699 A1 by Arletti et al.

29. With regard to claim 1, Povey et al teach a multistage process for the continuous production of an emulsion (1:11-14), the process comprising subjecting at least two

immiscible liquids (else they would form a solution rather than an emulsion) to a sequence of at least two mixing stages (2:90-95) carried out in one stator-rotor device (2:65-75) comprising at least one rotor disk 3 (figure 1) and at least one stator (2:69-70), the at least one rotor disk having a peripheral velocity, wherein a peripheral outlet 21-22-44 (2:1-28) from the stator-rotor device is connected to an axial inlet 37 (2:11-14) in the same stator-rotor device by means of a duct comprising an initial portion where the fluids exit the rotor-stator arrangement and an end portion, the initial portion of the duct being oriented in a direction substantially tangential to the circumference of the rotor (1:105-2:28), and the peripheral velocity of each rotor of said stator-rotor devices ranges from 5 to 60 m/s (26 m/s: 2:32-33). Povey do not teach a second stator-rotor device, connected to the first, having a Reynolds number inside the connecting duct higher than 5000.

d. However, Arletti et al teach a multistage process for the continuous production of an emulsion, the process comprising subjecting at least two immiscible liquids (para 26) to a sequence of at least two mixing stages carried out in at least two successive stator-rotor devices 1, 15 (figure 1) each comprising at least one rotor blade 4 and 16 and at least one stator, at least one of (14, 20, the unnumbered stator of the alternative embodiment of para 0035), the at least one rotor blade having a peripheral velocity, wherein a peripheral outlet 14 from a first stator-rotor device is connected to an axial inlet 14 (axial since within the central portion of the stator-rotor device 15, its axial draft tube 20, in proximity to its rotor axis [figure 1]) in a successive stator-rotor device 15

by means of a duct 14 comprising an initial portion and an end portion in which a Reynolds number Re_T inside said duct is higher than 5000 (para 24).

e. Povey and Arletti et al are analogous arts, being from the same field of endeavor, emulsifying immiscible liquids. At the time the invention was made, it would have been obvious to one of ordinary skill in the art, given the teaching of Povey to pass the effluent emulsion from a peripheral outlet of his rotor-stator disk back into the axial inlet of the same disk to improve the emulsive effect, to pass the same emulsion of Povey through two separate rotor-stator devices instead, as do Arletti et al: the motivation would have been to avoid the doubling of production time necessitated by using the same device twice; or alternatively, such would have been a duplication of parts obvious to one of ordinary skill in the art (see *In re Harza*, 274 F.2d 669, 124 USPQ 378 [CCPA 1960]); and to choose the dimensions of the connecting duct and/or the speed or pressure of the fluid passed through, such that the Reynolds number is higher than 5000: for Arletti et al teach the Reynolds number in the duct as a variable desirable of optimization (Arletti et al para 40), and it would have been obvious to one of ordinary skill in the art to have optimized this result-effective variable.

30. The additional elements of claim 2, wherein said emulsion comprises, as a dispersed phase, a molten adduct of magnesium dihalide-Lewis base, are taught by Arletti et al (paras 17 and 22).

31. The additional elements of claim 3, wherein said emulsion comprises, as a continuous phase, a liquid which is inert and immiscible with said molten adduct of magnesium dihalide-Lewis base, are taught by Arletti et al (paras 17 and 26).

32. The additional elements of claim 4, wherein said inert and immiscible liquid is selected from aliphatic and aromatic hydrocarbons, silicone oils, liquid polymers or mixtures of said compounds, are taught by Arletti et al (para 26).

33. The additional elements of claim 5, wherein said molten adduct of magnesium dihalide-Lewis base may be fed to said first stator-rotor device at a weight ratio of less than 0.5 with respect to said inert and immiscible liquid, are taught by Arletti et al (para 50).

34. The additional elements of claim 7, wherein the peripheral velocity of the at least one rotor disk is comprised in the range from 20 to 60 m/sec, are taught by Povey (2:32-33).

35. The additional elements of claim 8, wherein the Reynolds number Re_T inside said duct may be higher than 8000, are taught by Arletti et al (para 40).

36. The additional elements of claim 9, comprising a sequence of three mixing stages, are taught by Povey (2:93).

37. The additional elements of claim 10, wherein said magnesium dihalide is magnesium chloride, are taught by Arletti et al (para 28).

38. The additional elements of claim 11, wherein said Lewis base is selected from amines, alcohols, esters, phenols, ethers, polyethers, aromatic or aliphatic (poly)carboxylic acids, are taught by Arletti et al (para 27).

39. The additional elements of claim 12, wherein said Lewis base is an alcohol of formula ROH, in which R is an alkyl group containing from 1 to 10 carbon atoms, are taught by Arletti et al (para 27).

40. The additional elements of claim 13, wherein the molten adduct is $MgCl_2.mROH.nH_2O$, wherein m=0.1-6.0, n=0-0.7 and R=alkyl group C_1-C_{10}, are taught by Arletti et al (paras 27, 29).

41. The additional elements of claim 14, wherein m=2.0-4.0, n=0-0.4 and R=ethyl group, are taught by Arletti et al (para 29).

42. The additional elements of claim 24, where the end portion 65 of the duct is oriented in a direction substantially parallel to the rotation axes of each rotor, are obvious over Povey, who teach that the inlets 37-38 to the rotor should be axial (figure 1; 2:11-14).

43. The additional elements of claim 25, where rotation of the rotor forces the emulsion to flow from the rotor axis towards the peripheral rim of the rotor, are taught by Povey (2:15-23).

Prior cited and König

44. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0096699 A1 by Arletti et al in view of US 2,461,276 to Hetherington and US 1,489,786 to Povey, and further in view of US 4,089,835 to König et al. Arletti et al, Hetherington, and Povey do not teach that in each mixing stage a residence time is of less than 1 second. However, König et al teach a multistage process for the continuous

production of a dispersion or emulsion (2:34-43, 10:35-48), the process comprising subjecting at least two immiscible liquids (2:34-43) to a sequence of at least two mixing stages carried out in at least two successive stator-rotor devices (10:35-48) each comprising at least one rotor blade and at least one stator (being both rotor-stator devices), the at least one rotor blade having a peripheral velocity (11:13-20); and further teach that the residence time in each mixing stage may be 1 second, and that the residence time is a variable desirable of optimization (10:35-48). It would have been obvious to one of ordinary skill in the art to make the residence time of the emulsion-mixing method of Arletti et al, Hetherington, and Povey on the order of 1 second, as do König et al: the motivation would have been to use the mixing method to enhance chemical reactions between species carried in the emulsion having short reaction times (König et al 10:35-48); and it would further have been obvious to one of ordinary skill in the art to have optimized this result-effective variable.

45. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 1,489,786 to Povey in view of US 2003/0096699 A1 by Arletti et al, and further in view of US 4,089,835 to König et al. Povey and Arletti et al do not teach that in each mixing stage a residence time is of less than 1 second. However, König et al teach a multistage process for the continuous production of a dispersion or emulsion (2:34-43, 10:35-48), the process comprising subjecting at least two immiscible liquids (2:34-43) to a sequence of at least two mixing stages carried out in at least two successive stator-rotor devices (10:35-48) each comprising at least one rotor blade and at least one stator (being both rotor-stator devices), the at least one rotor blade having a peripheral

velocity (11:13-20); and further teach that the residence time in each mixing stage may be 1 second, and that the residence time is a variable desirable of optimization (10:35-48). It would have been obvious to one of ordinary skill in the art to make the residence time of the emulsion-mixing method of Povey and Arletti et al on the order of 1 second, as do König et al: the motivation would have been to use the mixing method to enhance chemical reactions between species carried in the emulsion having short reaction times (König et al 10:35-48); and it would further have been obvious to one of ordinary skill in the art to have optimized this result-effective variable.

Conclusion

46. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **this action is made final**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Janca whose telephone number is (571) 270-5550. The examiner can normally be reached on M-Th 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on (571) 272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJJ

/DAVID L. SORKIN/
Primary Examiner, Art Unit 1797